CLAIMS

We claim:

1. A method of identifying a set of routes for a net having a set of pins in a region of a design layout, the method comprising:

    a) partitioning the region into a plurality of sub-regions,

    b) identifying a first set of sub-regions containing the net's pins;

    c) determining whether a storage structure stores a set of routes for the identified first set of sub-regions;

    d) if the storage structure stores a set of routes for the identified first set of sub-regions, retrieving the set of routes;

    e) if the storage structure does not store a set of routes for the identified first set of sub-regions, generating a set of routes.

2. The method of claim 1, wherein generating the set of routes comprises:

    a) identifying a connection set of sub-regions that when combined with the first set forms a closed set of sub-regions that does not have any sub-region that is not adjacent to another sub-region in the closed set, wherein the storage structure stores a set of routes for the closed set, and

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b)   for the first set, retrieving the set of routes from the storage structure that are stored for the closed set of sub-regions.

3.   The method of claim 2, wherein the closed set can be traversed by a minimum tree route that connects each sub-region in the connection set to at least two

5   other sub-regions in the primary and connection sets of sub-regions.

4.   The method of claim 2, wherein the storage structure stores the set of routes for the identified first set of sub-regions when the first set of sub-regions is a closed set that has each of its sub-regions adjacent to another sub-region in the set.

5.   The method of claim 2, wherein a plurality of paths exist between the sub-regions defined by the set of partitioning lines, wherein routes are defined with respect to the paths.

6.   The method of claim 5, wherein a plurality of the paths are diagonal paths, wherein some routes traverse some of the diagonal paths.

7.   The method of claim 2, wherein a plurality of edges exist between the sub-

15   regions defined by the set of partitioning lines, wherein routes are defined with respect to the paths.

8.   The method of claim 7, wherein a plurality of the edges between the sub-regions are diagonal edges, wherein some routes intersect some of the diagonal edges.

9.   A method of identifying routes for nets in a region of a design layout,

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a)   partitioning the region into a plurality of sub-regions,

b)   for each of a plurality of nets,

identifying a first set of sub-regions containing the net's pins;

determining whether a storage structure stores a set of routes for

5   the identified first set of sub-regions;

if the storage structure stores a set of routes for the identified first

set of sub-regions, retrieving the set of routes;

if the storage structure does not store a set of routes for the

identified first set of sub-regions, generating a set of routes.

10.   The method of claim 9, wherein generating the routes for a net comprises:

a)   identifying a connection set of sub-regions that when combined

with the first set for the net forms a closed set of sub-regions that does not have any sub-

region that is not adjacent to another sub-region in the closed set, wherein the storage

structure stores a set of routes for the closed set, and

15   b)   for the first set, retrieving the set of routes from the storage

structure that are stored for the closed set of sub-regions.

11.   The method of claim 10, wherein the closed set can be traversed by a minimum tree route that connects each sub-region in the connection set to at least two other sub-regions in the primary and connection sets of sub-regions.

12.   The method of claim 10, wherein the storage structure stores the set of routes for the identified first set of sub-regions when the first set of sub-regions is a closed set that has each of its sub-regions adjacent to another sub-region in the set.

13.   A computer readable medium that includes a computer program for identifying a route for a net in a region of a design layout, the computer program comprising:

a)   a first set of instructions for partitioning the region into a plurality of sub-regions,

b)   a second set of instructions for identifying a first set of sub-regions containing the net's pins;

c)   a third set of instructions for determining whether a storage structure stores a set of routes for the identified first set of sub-regions;

d)   a fourth set of instructions for retrieving a set of routes if the storage structure stores the set of routes for the identified first set of sub-regions;

f. f
e)   a fifth set of instructions for generating a set of routes, if the storage structure does not store the set of routes for the identified first set of sub-regions.

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14. The computer readable medium of claim 13, wherein the fourth set of instructions comprises:

a) a sixth ~~fifth~~ set of instruction for identifying a connection set of sub-regions that when combined with the first set forms a closed set of sub-regions that does not have any sub-region that is not adjacent to another sub-region in the closed set, wherein the storage structure stores a set of routes for the closed set, and

b) a seventh ~~sixth~~ set of instructions for retrieving, for the first set, the set of routes from the storage structure that are stored for the closed set of sub-regions.

15. The computer readable medium of claim 13, wherein the closed set can be traversed by a minimum tree route that connects each sub-region in the connection set to at least two other sub-regions in the primary and connection sets of sub-regions.

16. The computer readable medium of claim 13, wherein the storage structure stores the set of routes for the identified first set of sub-regions when the first set of sub-regions is a closed set that has each of its sub-regions adjacent to another sub-region in the set.

17. The computer readable medium of claim 13, wherein a plurality of paths exist between the sub-regions defined by the set of partitioning lines, wherein routes are defined with respect to the paths.

18. The computer readable medium of claim 17, wherein a plurality of the paths are diagonal paths, wherein some routes traverse some of the diagonal paths.

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19.   The computer readable medium of claim 13, wherein a plurality of edges exist between the sub-regions defined by the set of partitioning lines, wherein routes are defined with respect to the paths.

20.   The computer readable medium of claim 19, wherein a plurality of the edges between the sub-regions are diagonal edges, wherein some routes intersect some of the diagonal edges.